

FACILITATING COLLABORATIVE PLANNING IN HAWAI'I'S NATURAL AREA RESERVES



Research Network Report
Number 8 · December, 1996

ASIA FOREST NETWORK

The Asia Forest Network supports the role of communities in protection and sustainable use of the region's natural forests. The Network comprises a select coalition of Asia planners, foresters, and scientists from government agencies, universities, and non-government organizations. Solidarity of Network members is based on a common commitment to exploring alternative management strategies for Asia's disturbed natural forestlands. The Network's research emphasis includes the ecology of natural regeneration, the economics of non-timber forest product systems, and the community organizations and institutional arrangements that support participatory management. Lessons stemming from this research are used to inform field implementation procedures, reorient training, and guide policy reform.

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Front Cover: Kohala Mountain on the island of Hawai'i
Photo: M. Poffenberger

Back Cover: Wild pig (*Sus scrofa*) in Hawaiian rain forest
Photo: J. Jeffrey

Facilitating Collaborative Planning
in
Hawai'i's
Natural Area Reserves

by

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with

Jeff Burgett
Lloyd Case
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Bill Stormont
Marjorie Ziegler



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ACRONYMS

CADR	Center for Alternative Dispute Resolution
DLNR	Department of Land and Natural Resources
DOFAW	Division of Forestry and Wildlife
GMA	Game Management Area
NAR	Natural Area Reserve
NARS	Natural Area Reserves System
NAWG	Natural Areas Working Group
RFMAC	Regional Forest Management Advisory Council

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This is the first Asia Forest Network case study that addresses efforts in the United States to integrate community involvement in forestry management issues. The lessons emerging from this region provide interesting insights and, possibly, new directions for natural resource managers who seek to meet similar objectives. A number of people are the pioneers of this project, and I would like to first acknowledge each member of the Natural Areas Working Group (NAWG) and the Kohala Forest Advisory Council. Their perseverance and efforts in designing the first road map for collaborative management practices within the Natural Area Reserves are an excellent starting ground for finding the balance between human interests and environmental protection. I hope it will be an enduring guide for others to follow. I thank each of you for your time and input along the way. A number of NAWG members and others have assisted throughout the research, the development of the case study, and in the final editing stages. To Bill Stormont, Lloyd Case, Marjorie Ziegler, Lili'uokalani Ross, Kim Harris, Julie Leialoha, Peter Schuyler, and Jeff Burgett, a special thanks to each of you for your time, input, and infinite patience. The talented Peter Adler, Alice Paet-AhSing, and Ken Boche, who facilitated the NAWG and Kohala meetings with skill, creative imagination, and humor, deserve commendation. Their commitment to the facilitation process has continuously supported and guided the group members in meeting their pursuit of finding consensus solutions. A special thanks to the contributions of the photographers, Jim Jacobi, Chris Evans, Jack Jeffrey, and Mark Poffenberger. I would like to acknowledge the kind assistance of Professors George Kent, Carolyn Stephenson, and Neal Milner at the University of Hawai'i who provided invaluable guidance in revealing some of the academic lessons inherent in this facilitation. A special thanks to DeeDee Letts, of Hawai'i's Center for Alternative Dispute Resolution, for her continuous encouragement and for providing background information throughout the process.

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Cynthia Josayma

EMERGING TRENDS IN COLLABORATIVE PLANNING

Forest resource management agencies around the world are increasingly facing similar dilemmas. They are typically mandated to oversee the largest landholdings of the state, with limited labor and underfunded budgets, as the natural land that they oversee has been traditionally viewed as self-sufficient in terms of regeneration and sustainability. Increasingly, the land they must manage consists of not only revenue-producing forest areas, but also the last remaining stands of old-growth forests, sanctuaries for endangered species, and critical watersheds that serve as the primary freshwater source for growing urban centers. These areas need new forms of management to assess, monitor, and protect the environmental sustainability of the land. Resource managers today also find that their work is coming under increased public scrutiny from special interest groups, shifting their principal role from natural resource managers to managers who must integrate contending interests in the natural environment.

In the United States, there has been a growing trend to link public interests with land resource management planning through a forum of facilitated meetings.¹ The common factors are the professional services of a facilitator, whose central role is to serve as a moderator of discussions, and a representational group of interests, whose agreed premise for participation is to work toward collectively defining a new operational strategy. The facilitation practice has stemmed out of the mediation/conflict resolution field, which has sought to find new interactive mechanisms to encourage consensus resolution to social tensions. The promised benefits of facilitated meetings for land-use issues are realistic planning through defining the goals, limitations, and capabilities of both the people and the ecosystems under discussion.²

In Hawai'i, the facilitated meeting process has been used to tackle a variety of environmental and social issues. This case study focuses on a conflict that erupted over the issue of fencing within the native forests, and the differing opinions on the impact of feral pigs (*Sus scrofa*) and

hunting in ensuring a relatively pristine environment. On the Big Island of Hawai'i, local hunters, Hawaiian cultural practitioners, community members, and environmentalists have been participating with the Hawai'i State Division of Forestry and Wildlife (DOFAW) in a series of facilitated meetings to find consensus on the best methods for sustaining the natural resources within the Natural Area Reserves System (NARS). This system contains examples of the best remaining native ecosystems and geologic features on state lands in Hawai'i. The working group addressed many contemporary land management issues such as native and nonnative species, cultural and urban interests, local community and state control. The results have been a series of group recommendations and resolutions that have been sanctioned by the Hawai'i State Legislature. A significant outcome has been the devolution of the meeting process from an island-wide planning group to a series of regional working groups, which are designing locally specific management programs that more clearly represent the interests of the local communities and address site-specific environmental pressures.

As the world population continues to expand at an unprecedented rate and the global resource base shrinks, the need to actively engage all people in the task of attaining environmental sustainability has reached a critical juncture. The emerging lessons from this case study highlight the productive capabilities of integrated planning. Placing public interest at the forefront of land management planning has the potential to reduce the time spent and financial costs of reversing decisions passed without public approval, while simultaneously engaging participants in an active learning process regarding methods to assess environmental health.

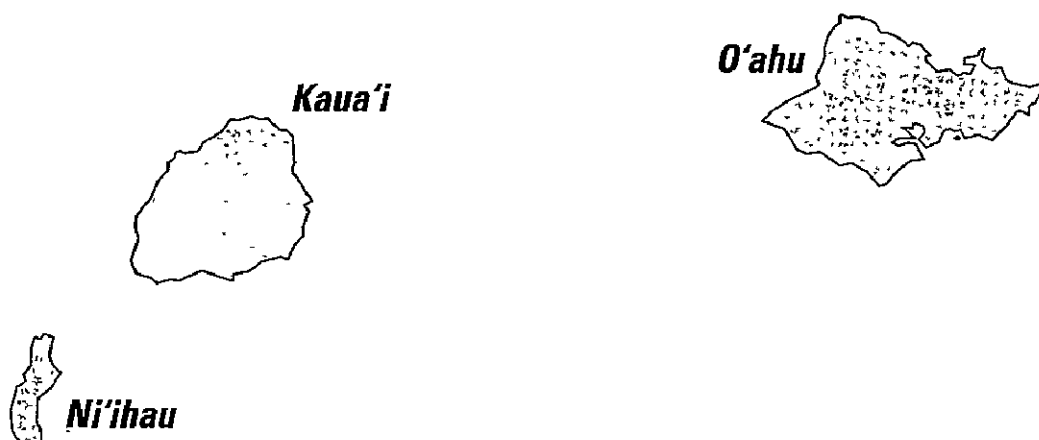
The people of Hawai'i have a special place on this earth. We hope the time and energy that these individuals have contributed as participants in this innovative meeting process to bridge their differences will serve as a model for other individuals similarly engaged in managing the remaining pristine areas in the world.

HAWAI'I'S LAND AND PEOPLE

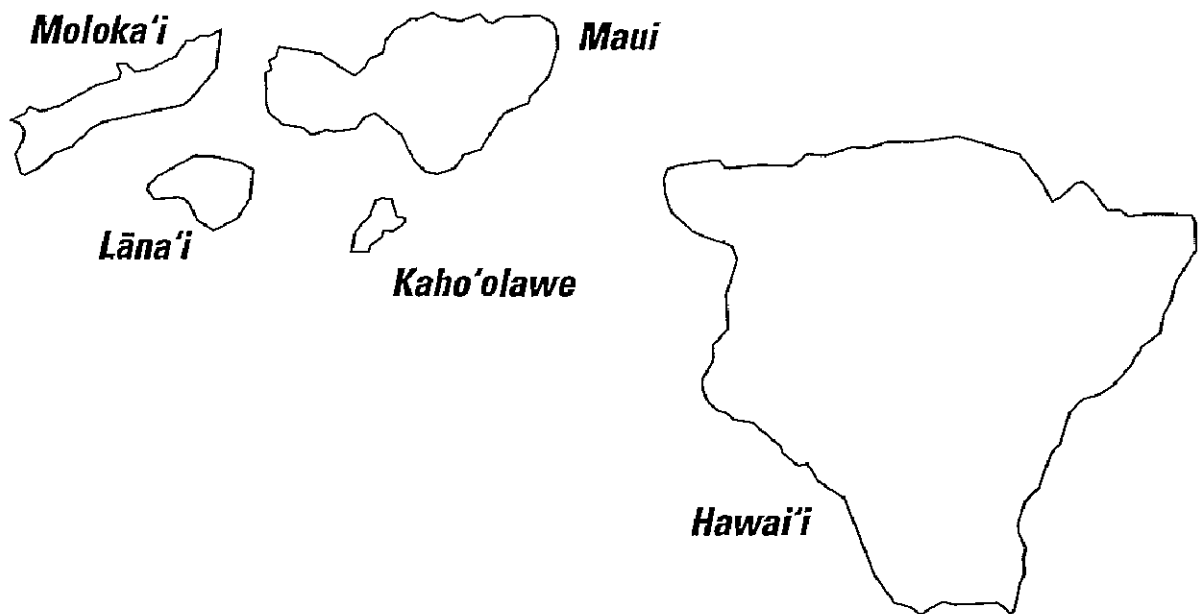
The issues discussed in this case study have emerged in a contemporary setting, but the systemic relationship between the plants, people, and pigs has been unfolding for centuries. For more than 70 million years, a chain of islands has been forming in the middle of the Pacific Ocean, 2,500 miles from the nearest continent. As the earth's plates shift, periodic eruptions of lava spill forth into the surrounding blue ocean waters, creating new land masses. A diversity of ecosystems took form upon these new islands, from snow-peaked mountains to deserts and grasslands, lush rain forests, dry forests, and volcanic terrain. The isolation of the Hawaiian islands formed a unique ecology beginning from small seeds that blew in on tradewinds or were carried in by migrating birds. Over the centuries, approximately 6,000 invertebrates, 1,000 plants, and 130 native bird species evolved.³ Only two native terrestrial mammals, the hoary bat (*Lasiurus cinereus semotus*) and monk seal (*Monachus schauinslandi*) are known to have lived among the islands prior to human settlement (Figure 1).

The first humans to reach the islands were the Marquesans, beginning around 500-700 A.D. These first settlers brought agricultural plants including kalo (*Colocasia esculenta*), sweet potatoes (*Ipomoea batatas*), and coconuts (*Cocos nucifera*), along with domesticated animals such as the pig (*Sus scrofa*), dog (*Canis familiaris*), and junglefowl (*Gallus gallus*). Over the centuries, Hawaiians developed a land resource use system, (*ahupua'a*), watershed-based land divisions that ran from the edge of the coral reefs into the uplands. The ali'i (*chief*), oversaw the jurisdiction of the ahupua'a, assisted by the konohiki (*land manager*). The duties of the konohiki included supervision over the building of irrigation ditches, planting and harvesting schedules, monitoring restricted areas, and collecting taxes in the form of goods and labor from the maka'ainana (*the people of the land*). The maka'ainana were the farmer and the fisherman, the maker of kapa (*cloth*), and the pounder of kalo into poi (*the starch staple in the Hawaiian diet*). Their landholdings, (*kuleana*), were subdivisions of the ahupua'a.⁴ The highest regions of the land (*wao akua*),

Hawai'i's Environmental and Social Evolution **Figure 1**



	<i>Previous 70 million years</i>	<i>Polynesian settlement A.D. 500–700</i>	<i>Western settlement 18th century</i>
PLANTS	1,000 endemic plant species	32 introduced agricultural plants <ul style="list-style-type: none"> • taro • coconut • yam • breadfruit • etc. 	→
BIRDS	130 endemic bird species	→	→
MAMMALS	2 mammals <ul style="list-style-type: none"> • bat • seal 	<ul style="list-style-type: none"> • Polynesian pig • dog • rat • chicken 	<ul style="list-style-type: none"> • European boar • sheep • goat • deer • cattle
POPULATION	– 0 – – 0 –	Approximately 100 settlers →	800,000 → USA and European migration England Portugal Spain Germany etc.
LAND-USE	Total area of Hawai'i 4,140,800 acres	Approx. 64,000 acres developed <ul style="list-style-type: none"> • wet land – taro cultivation • dry land – other agricultural crops 	→ Timber industry Agriculture



19th century		1904	1970	1990s
<ul style="list-style-type: none"> • sugar • pineapple • coffee • macadamia • papaya • etc. 	1,200,000 acres	238,000 acres 64,000 acres		Sugar plantations closed – 75,000 acres ready for conversion. Approx. 200 threatened & endangered endemic plants. 84 endemic bird species extinct. 32 endemic bird species endangered.
		156 introduced birds <ul style="list-style-type: none"> • song birds • pigeons • doves • etc. 		
<ul style="list-style-type: none"> • horse • donkey • mongoose • cat • etc. 		48 introduced birds established		
57,000 – decline due to introduced disease				60,000
Asian migration	Japan China Korea Philippines etc.	250,000	770,000	1,200,000
Ranching		Forest reserve established		1,480,000 acres designated.
Plantations		Urban growth	NARS established	109,000 acres. 19 reserves.

were the sacred uplands and were taboo (*kapu*), as the dominion of the gods. The watershed areas were the islands' primary source of freshwater, capturing rainfall of 10 to 400 inches annually. Farther down the ahupua'a, in the lowlands and along the hillsides, agricultural fields and ponds were established. The Hawaiian farmer built extensive irrigation ditches to grow kalo, sweet potatoes, yams (*Dioscorea spp.*), sugarcane (*Saccharum officinarum*), and breadfruit (*Artocarpus altilis*), which are all introduced agricultural crops. The pig, dog, and junglefowl, which were kept near the home, were used for food and ceremonies. The pig was by far the most sacred of the domestic animals, honored and used in many Hawaiian rituals from the death of an elder to the birth of a child.

The Hawaiian people had an indigenous mediation system to resolve conflicts. When disputes arose among family members, a family elder would be called upon to lead a *ho'oponopono* to find resolution. The principal components of the *ho'oponopono* were the gathering of the family, a statement of the conflict by each party, a promise to reveal each thought and action with complete honesty, an agreement that the elder can call for moments of reflection if emotions run high, an individual self-inquiry by all members of their responsibility in contributing to the problem, and finally the resolution to seek a binding solution that forgives and releases all previously held ill will. The *ho'oponopono* was commonly used to keep harmony and peace among family members.⁵ Within the community, the kapu system regulated the lives of the people through defining sacred privileges, as well as the rights and prohibitions between people and the land. Kapu determined the appropriate conduct of the *ali'i* toward the *maka'ainana*, designating the days of work and the days of religious observance, as well as conduct among people.

For centuries, the lives of the Hawaiian people followed a pattern of planting and fishing, and observing social customs. Throughout thirteen centuries, the human population expanded to 800,000 and the human impact on the environment, coupled with the introduction of agricultural and irrigation systems, began to transform the landscape in the settlement areas.⁶ The use of fire to clear land contributed to elimination of some lowland forests and the replacement of native grasses by fire-adapted species.⁷ However, the Hawaiians believed, fundamentally, that they were a people of the land, and not separate or distinct from the diversity of life

that manifested around them. Each action upon the land and each taking of life, be it fish, pig, or plant, was done with a prayer to the gods for continuity of life. Thus, Hawai'i remained for centuries the home of a people living upon an insular land with a homogeneous culture.

Winds of Change

In 1778, Captain James Cook, an English explorer, caught sight of the chain of islands, placing Hawai'i on Western navigational maps. Within only a few years, a stream of boats sailed through for trade, and restocking food and water on the long trip between Asia and the west coast of North America. The arrival of ships from around the world had a profound and immediate impact on the islands, creating changes in the political, social, and cultural values of the Hawaiian people. Imported iron implements (axes, guns, and knives) were exchanged for local pigs and sweet potatoes. On subsequent trips, European boars (*Sus scrofa*) were brought to the islands, along with sheep (*Ovis aries*) and goats (*Capra hircus*) for trade. The boars were crossbred with the Polynesian pig, with some animals left to forage within the forests for mountain apples (*Syzygium malaccense*) and guavas (*Psidium spp.*).⁸ The newly introduced goats, sheep, and cattle (*Bos taurus*) were put out for grazing with a strict kapu against hunting them in the early years, which rapidly established a substantial population of animals. Within a few decades, there was a rapid degradation of the soils and native vegetation. The trade in iron axes led to the commercialization of Hawai'i's extensive sandalwood trees (*Santalum spp.*) for markets in Asia, effectively decimating the islands' sandalwood forests within twenty years.⁹ By 1810, King Kamehameha I, from the Kohala District on the island of Hawai'i, consolidated all of the islands under his rule with his new acquisitions of guns and ships, purchased through timber sales. Concurrent, however, with the unification of the Hawaiian Islands was the foreign introduction of illnesses such as smallpox, measles, and cholera, against which Hawaiians had no resistance, resulting in a sudden decline in the indigenous population to 57,000 by 1866.¹⁰

From the time of King Kamehameha I's rule, Western culture, religion, and political ideas began to supersede traditional Hawaiian customs. The Western concept of landownership was introduced to support the increase

in expenses of the Hawaiian government. The Great Mahele of 1848 culminated in the division of four million acres between the King and the *ali'i*.¹¹ The land was divided into new Government Lands and Crown Lands. The Kuleana Act of 1850 authorized the distribution and sale of kuleana three-acre plots to the *maka'ainana* for nominal prices, with the provision that the land be registered and annual taxes be paid to the government. These policies, however, worked against the Hawaiian people. The concept of private ownership was not well understood, and only a total of some 30,000 acres were distributed. Within a few years the majority of the Hawaiians had already either abandoned or sold their ownership rights to the new immigrants.¹²

The Crown Lands were divided into leaseholdings upon which the first large-scale plantations were established for sugarcane and, later, pineapple. These plantations significantly changed Hawai'i's farming practices from a subsistence to commodity orientation. Laborers were brought in successively from China, Japan, Korea, and the Philippines, and managers from Europe. With the growth in commercial markets, there was also increased involvement by the new immigrants in the political organization of the islands. By the late 1880s, the economic and political strength of the agricultural industry forced King David Kalākaua to accept a new constitution drafted by a group of industrialists that both limited his political power and limited suffrage to landowners. The next heir to the Hawaiian throne, Queen Lili'uokalani, who reigned from 1892-95, became increasingly concerned that native Hawaiians were becoming marginalized within their own country. She challenged the validity of the new constitution in the courts and won; however, before a new constitution could be drafted, the Queen was overthrown by American sugar barons who established a provisional government, and in 1893, requested annexation to the United States. Although the overthrow of Queen Lili'uokalani and the initial request for annexation were declared illegal by President Grover Cleveland, the provisional government refused to relinquish control. With a change in American government a few years later, the decision was reversed in the U. S. Congress, and in May 1898, Hawai'i was officially annexed by the U.S. as a territory and all of the Government and Crown Lands were entrusted to the American government.

The first Forest Reserve in Hawai'i was established in 1904, following the formation of a Board of Commissioners of Agriculture and Forestry whose mandate was to protect and extend the existing 1.2 million acres of forest throughout the islands. During the next 50 years, 68 percent of the forest came under government control, with the rest held by private owners. The primary function of the government was to ensure sustainability of the remaining forest lands and the watershed regions, through a management program focusing on reforestation and protection.¹³ The population of immigrant workers continued to expand, meeting the labor needs of the growing sugar and pineapple plantations. Alongside plantations, significant amounts of acreage were converted to pasture lands to support the expanding cattle and dairy industries throughout the islands. Across the chain of islands, the American government set up military bases, which became one of Hawai'i's primary revenue sources. Following World War II, tourism to the islands exploded and by the mid-1950s, it became the fourth largest industry after sugar, pineapple, and the military.¹⁴ In 1959, with the majority of the population now consisting of recent immigrants, the people voted to end their territorial status, and Hawai'i became the fiftieth state of the Union. The new State of Hawai'i was now responsible for all public lands, and the Department of Land and Natural Resources (DLNR) was commissioned to oversee management of lease lands, forestry and wildlife, game management, and parks and recreation.

Establishing the Natural Area Reserves

The years from 1960 to 1970 in the United States have been marked as the decade in which environmental issues came to the forefront of national attention. The U.S. Congress approved the Wilderness Act, the Endangered Species Act, and the National Environmental Policy Act. The U. S. Forest Service sought Congressional approval for the Multiple Use-Sustained Yield Act, which mandated the use of national forests to include not only timber and rangeland management, but also watershed protection, fish and wildlife management, and recreational development.¹⁵

In Hawai'i, the issue of environmental protection had particular resonance as a significant number of native ecosystems were increasingly

showing signs of stress. In a state where 90 percent of the plant and animal species are endemic and unique to the place, it was of great concern when researchers and resource managers began to document a sharp decrease in the number of native plants, birds, and invertebrates. More than one-half of Hawai'i's forest birds were already extinct, and of the remaining, 32 bird species were eligible for the new classification of "endangered," as were hundreds of Hawai'i's plants. Following several years of environmental lobbying, the Hawai'i State Legislature passed Act 139, which mandated the establishment of a Natural Area Reserves System (NARS) in 1970, so that "the unique natural assets should be protected and preserved both for the enjoyment of future generations and to provide base lines against which changes which are being made in the environments of Hawai'i can be measured [and] that a state-wide natural area reserve system be established to preserve in perpetuity, specific land and water areas which support communities, as relatively unmodified as possible, of natural flora and fauna, as well as geological sites of Hawai'i."¹⁶

A Commission was appointed to oversee the establishment of the NARS, made up of six specialists in botany, zoology, and geology, along with one member each drawn from the departments of Land and Natural Resources, Education, Agriculture, Planning and Economic Development, and the University of Hawai'i.¹⁷ By 1971, the NARS Commission had developed guidelines that delineated representation, scientific value, and size and number of areas for selection within the NARS. The commission also clarified the term "enjoyment" within the original Legislation of Act 139, specifying that enjoyment did not mean recreational pleasures, but rather that it embraced the activities of "cultural or scientific enrichment or satisfaction."¹⁸ The selection of reserves would be based on the uniqueness and significance of each ecosystem; contain fauna and flora under direct threat and not currently protected; and consist of as diverse a selection of Hawai'i's native ecosystems as possible. An additional criterion included a reasonable ability for managers to protect the reserves from pests, humans, and legal encroachment. The first NARS report entitled "The Hawai'i Natural Area Reserves System: Criteria for Selecting Natural Areas" predicted a need for up to 100 reserves, drawn from state-controlled land across the Hawaiian Islands. These areas

would preserve representative sections of the natural environment ranging from high alpine deserts, volcanic terrain, and grasslands to rain forests and coral reefs.¹⁹

The site nomination process for NARS inclusion is open to both public and private interests. A proposal must first be submitted to the Honolulu-based commission, which ensures that the criteria for inclusion have been met. If the site passes the initial review, the proposal is sent to the NARS staff to develop a public presentation for the communities on the island where the site is being proposed. Following a public meeting, a formal recommendation for the site is submitted to the commission for formal approval. The recommendation is then sent to the Board of Land and Natural Resources and finally to the governor of Hawai'i, who approves it through executive order. Once a site has been designated as an NAR, boundary changes can only be made by repeating the entire process.²⁰ The responsibility for managing the NARS was assigned to the Division of Forestry and Wildlife, within the DLNR.

The first NAR *'Ahihi-Kina'u*, on Maui, established in 1973, was selected for its lava flow, anchialine pools, and marine ecosystem. The largest NAR, *Manuka*, with a total of 25,550 acres of dry and mesic forests, is on the island of Hawai'i; the smallest, *Ka'ena Point*, consisting of 34 acres of coastal dune lands, is located on O'ahu. By 1991, nineteen NARs had been established with a combined total of 109,000 acres.²¹ After the NARs were selected, management and protection issues took precedence. There was increased interest to develop a systematic method of monitoring the holdings to fulfill the original intentions of the NARS "to provide base lines against which changes which are being made in the environments of Hawaii can be measured."²² A management policy was drafted, which stated that the two primary objectives of the NARS were to control human impact and biological disturbances. Human impact included marijuana (*Cannabis* sp.) cultivation that involved small to large land clearing and vegetation disturbance, off-road vehicle use, and fire threats. Biological concerns included the rapid spread of aggressive, nonnative plant species and feral animals, such as pigs, goats, sheep and deer (*Axis axis* and *Odocoileus hemionus*).²³

In 1987, the governor of Hawai'i and the State Legislature approved funding to begin active management of the system. The Natural Heritage

Program of The Nature Conservancy of Hawai'i was contracted to conduct biological surveys of the reserves.²⁴ The program's final report noted that the NARS included 43 percent of Hawai'i's 180 natural ecosystem types, with another 30 percent falling under the protection of other forest reserves, parks, or private sanctuaries. However, 27 percent of the native ecosystem types still were not under any formal management or protection. The Hawai'i Natural Heritage Program recommended, that to fulfill the mandate of the NARS, greater management over the reserves was crucial; new reserves would have to be designated to include the remaining unprotected ecosystems; and state, federal, and private interests would need to work together to achieve these goals.²⁵

Communities on the Big Island

The island of Hawai'i, popularly known as the Big Island, is the largest of all the islands, consisting of 4,038 square miles, with two mountains more than 13,600 feet high. Geologically, the Big Island is the youngest in the chain, with active volcanoes still expanding the land base with frequent eruptions. The island was the home of King Kamehameha I, the first king to consolidate the archipelago under his rule, and subsequently the home of Parker Ranch, one of the largest cattle-ranching businesses in the United States. Sugar, macadamia nuts, and coffee, along with ranching, have been leading commodities providing employment for the majority of the local population. The Big Island reflects the cultural diversity of the rest of the islands, with Hawaiians coexisting and intermixing with Caucasians, Japanese, Chinese, Portuguese, and other cultural groups who have made Hawai'i their home.

Since 1970, the population of the island has doubled, from 63,000 to more than 120,000. There has been a significant shift in the local economy as 94,500 acres of sugar plantations have been gradually closed, due to increasing labor and production costs with the rising overall economy of the islands.²⁶ Local per capita incomes have escalated from US \$9,700 in 1980 to US \$16,800 by the mid-1990s, but unemployment has also increased from 4.2 percent in 1991 to 7.3 percent in 1993.²⁷ The displacement in recent years of community members who had been company employees has led to a stressful period of employment transitions for the Big Island, as many of the new job opportunities are in the

service sector and do not offer the wages nor the job security that the plantation system provided.

Another important change in the islands has been the reemergence of Hawaiian culture. Beginning in the mid-1960s, Hawaiians have been organizing to reinvigorate their traditions and promote their rights to be involved in land management. Numerous groups have formed to support the reintroduction of the Hawaiian language, culture, and native history into the public school system.²⁸ Sovereignty and self-determination of the islands as a political future for Hawai'i are actively embraced by many groups. With the revival of Hawaiian culture, which was indelibly tied to land conservation values, there has been growing momentum to assure that the contemporary generation has access to land in order to learn and practice their culture.²⁹ Two public trusts include Hawaiian land that may be affected by the future direction of Hawaiian interests. The first, the Hawaiian Home Lands Trust, which consists of 188,000 acres, was established by Prince Jonah Kuhio Kalaniana'ole in 1921 to assure that Hawaiians would have a permanent land base for homesteading.³⁰ The second trust consists of 1.4 million acres of ceded Government and Crown Lands, which were managed by the U.S. government at the time Hawai'i became a territory and were subsequently returned to the new State of Hawai'i for governance in 1959. Following the successes of settling historic land claims by Native American Indian tribes with the U.S. government, Native Hawaiians have been reviewing the land divisions that occurred during the Great Mahele to better understand the social causes and political consequences to Hawaiians at that time, which had eventually led to the loss of their country.³¹

For generations, life on the Big Island had primarily revolved around work in agriculture or ranching, and recreation was found in the surrounding natural environment. The ocean provided people with the pleasures of surfing, canoeing, and swimming, as well as fishing; the forests were the places for exploring the rich diversity of plants and animals, the gathering of flowers and herbs, as well as hunting introduced game birds and mammals. Popular hunting grounds today on the Big Island are located within the Kohala Mountains, in the northern portion of the island; the Hamakua and Laupahoehoe forests above the northeastern coast; and around Pu'u Maka'ala to the south, near Hawai'i Volcanoes

National Park. Most of this land falls within the 702,000 acres of the state Forest Reserve, of which 82,805 acres in eight irregular parcels have been designated as Natural Area Reserves.³² These areas contain dense native rain forests, are home to rare and endangered plants and animals, and are bordered by agricultural lands (Figure 2).

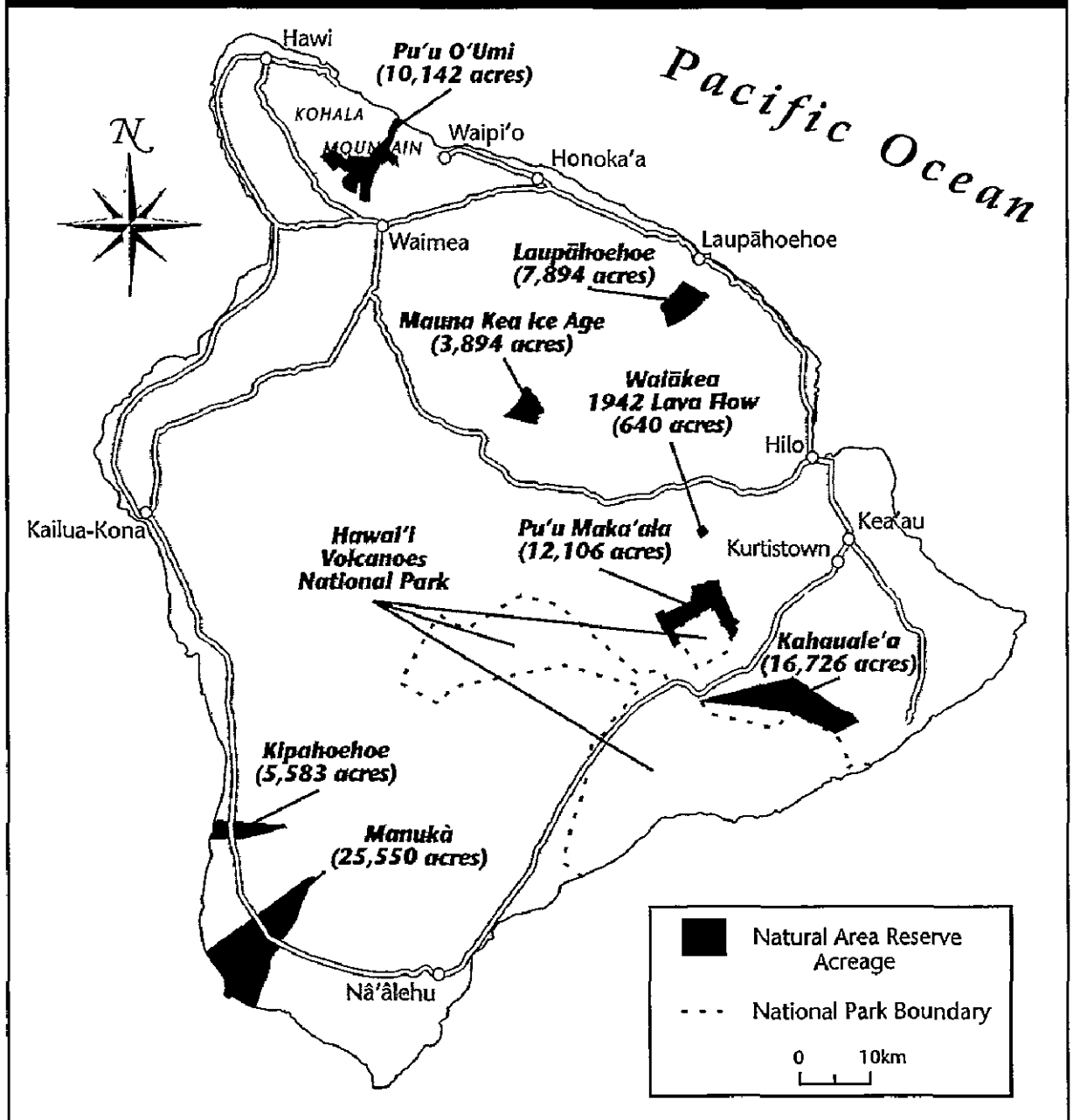
Hunters traditionally rely on the forest near their homes that their families have used for generations. Until the mid-1980s, the population of pigs was high enough that a half day in the forest would easily provide a group of hunters with their bag limit of two pigs per person, per day. Hunters use dogs, as well as signs of recent foraging to track pigs, following their migration routes from the lower slopes of the mountains, where pigs feed on the exotic seasonal fruits of the guava and mountain apple, to the upper elevations where they give birth in May and September.³³ Traditionally it was said that "When the sea is rough, the fruit is in season, the pig is fat, that is the time to hunt. When the ocean is calm, then the fish are fat, the pig is thin from giving birth, that is the time to fish."³⁴

Another aspect to the feral pig in the Hawaiian forest is its environmental impact on the native vegetation. Scientists have determined that feral pigs are the "most pervasive and disruptive alien influence on the unique native forests of the Hawaiian Islands."³⁵ As pigs forage for worms, tree ferns, tubers, grasses, and fruits, they uproot the soil and disturb the biotic diversity. The impact of pigs trampling and foraging in the forest creates wallows, which in turn become breeding sites for mosquitoes. Finally, pigs disperse plant seeds through their scat, promoting the spread of invasive nonnative plants.

Beginning in 1910, feral pigs were controlled by the Noxious Animal Eradication Program, overseen by the Hawai'i Territorial Board of Agriculture and Forestry. The principal control mechanisms were shooting and dog-assisted hunting in remote areas. On the Big Island alone, nearly 86,000 pigs were killed within 48 years, averaging about 14,500 a year from 1947 to 1958.³⁶ By 1986, new pig control mechanisms had been developed specifically to reach populations located in difficult terrain. In Kipahulu Valley on the island of Maui, selective fencing and snares used in conjunction with hunting successfully reversed a 40 percent decline in the native plant flora within five years. Transects were

HAWAI'I

Figure 2



established to assess the population distribution and to determine the pig birthrate in the area, and studies recommended a removal rate that exceeds the birthrate, thus assuring a constant reduction of pigs in the forest.³⁷

In 1988, the Hawai'i Natural Heritage Program staff of The Nature Conservancy of Hawai'i conducted a field inventory of the Pu'u O 'Umi NAR to document the natural resources, produce a management plan that would outline the threats to the native ecosystem, and propose strategies to protect the area. They identified eight natural communities, six of which were typical of very wet montane windward slopes. There were three types of 'ōhi'a (*Metrosideros polymorpha*) forest. The 'ōhi'a/olapa (*Cheirodendron* spp.) was the dominant type with a forest canopy of up to 30 feet and an understory of mixed ferns, shrubs, and a ground cover of mosses. The other two communities were rare bogs; one of mixed grass and sedge montane and the other, an 'ōhi'a-mixed montane bog. They verified three rare plant species and four native bird species, as well as a high diversity of native invertebrates in areas where the ecosystem was diverse and intact. They also found signs of feral pigs within every transect.³⁸

To address the feral pig impact within the Pu'u O 'Umi NAR on the Big Island, the Hawai'i Natural Heritage Program recommended to the DLNR that an aggressive control program for long-term reduction of pigs be started using "access improvement and shelter construction, fence construction and maintenance, and pig removal."³⁹ As of 1989, only one road led into the reserve. Two additional locations were recommended to provide access across state lands. Other recommendations included: (1) a well-defined trail system to minimize injuries to people walking in the reserve; (2) a one-mile fence to link with the steep cliffs along the Waimanu and Waipi'o valleys to form a protective boundary for a 630-acre Bog Management Unit to protect two rare bogs; and (3) ungulate control through a combination of public hunting, volunteer support, snaring, and shooting pigs in remote areas from helicopters. To control invasive plants, the Program recommended herbicides and manual removal, particularly along pig trails and fences, with priority given to maintaining the pristine areas. Finally, the Program also recommended a Public Information and Volunteer Program be established to aid public

understanding of the region's ecological importance and to gain support for the managers' objectives.

In spring 1992, a group of pig hunters from Hamakua and Waimea met at a trail head of the Pu'u O 'Umi NAR in the Kohala Mountains. The men released their dogs to begin tracking the scent of the wild pig. On their way up the path, the men were surprised and then angered when they came upon a new fence.⁴⁰ The fence had been authorized by the Hawai'i Branch NARS manager for the Big Island who had finally received state funds to build the fence to meet the reserve's management objectives.⁴¹ What had not occurred, however, was notification to the general public that DOFAW planned to begin fencing.

Several pig-hunting clubs, whose interests ranged from rehabilitating forest trails to organizing annual hunting competitions, had been formed in recent years throughout the Big Island. These clubs were also working to establish better lines of communication with DOFAW to assure that the hunters' interests and concerns would be considered in the management of public lands, including the NARS. The hunters felt that the establishment of this new fence line was a deliberate attempt to restrict access to their traditional hunting grounds. Upon returning home, they were upset to learn that no one in the community had been informed of the fencing project.⁴² The unexpected appearance of a new fence in a forest that had long been a favorite hunting area on the Kohala Mountain became the catalyst for the hunters to demand to be involved in DOFAW's management plans for the NARS. To the hunters, the fence symbolized the communication divide between their interests and that of the DOFAW, as well as the increased encroachment on the freedom of the pig and people to move unrestricted upon the mountain. The hunters contacted their district state legislator with their frustration over finding the fence at Pu'u O'Umi and to express their additional concern that the DOFAW might be intending to eradicate the wild pig within the reserve. The state legislator advised the hunters to draft a resolution to stop all fencing and possible eradication plans until a series of facilitated public meetings between the local community and the DOFAW could be held.

In May 1993, the Hawai'i State Legislature passed two resolutions with support from hunters, environmental groups, and DOFAW. The first, House Concurrent Resolution No. 183, ordered DOFAW to hold public

information meetings regarding the land-use management objectives and activities in the Kohala Mountain and Waimanu Valley. The second, House Concurrent Resolution No. 185, stated that DOFAW should accommodate the hunters' interests to better manage the pig populations in the Laupahoehoe NAR. In order to comply with the two resolutions, DLNR contacted the Center for Alternative Dispute Resolution (CADR), requesting a list of qualified facilitators to lead the public information meetings. The CADR, which is situated within the State Judiciary, was one of the first four state mediation offices in the nation to receive federal funding support in 1985. As a result, the services of professionally trained facilitators have been increasingly sought by people around the islands to assist in the resolution of public dispute conflicts or to facilitate policy roundtables.⁴³

FORMING THE NATURAL AREAS WORKING GROUP

To comply with the resolutions, DOFAW formed a representational group of interests to assist in designing public information meetings on the Big Island. One primary objective of the group was to address the hunters' concerns regarding fencing as a management tool in the NARS Big Island. However, another objective was to explain the environmental impact that scientists had attributed to feral pigs and invasive plants in the forest, which led to DOFAW's decision to begin fencing. The intention of forming such a group was to come to consensus on what the central conflicting issues were that needed to be addressed, and then to work together to solve them.

To ensure that a representational group was formed, the Hawai'i NARS manager worked with hunters and environmentalists to identify other interested parties as participants. Twenty people, including environmentalists, community activists, representatives of hunting interests, and representatives of state and federal conservation and game agencies, agreed to participate.

Two CADR facilitators were selected by DOFAW to lead the group. The first facilitated meeting began in March 1994 on the Big Island. The initial time frame called for bi-weekly meetings, with two rounds of public information meetings, concluding in October 1994. The first few group meetings were designed by the facilitators to introduce the group to the working style of the meeting process, as the majority of the people had never participated in such a group before. The facilitators opened the meeting by proposing "Rules of the Road," which defined the expected conduct of participants during the meetings (Box 1).

The facilitators then requested the group to choose a name for itself, and the members decided on "Natural Areas Working Group" (NAWG). The group also developed a goal statement representing its objectives, which took several meetings to agree upon, which stated: "How do we fairly balance and accommodate the various interests that have a stake in the NARS and maintain a healthy forest and social community?" The members discussed the original intention of DOFAW to "have a public

BOX 1.

RULES OF THE ROAD

1. Speak for the broadest interest of your group, not personal views.
2. Disclose the “hat” you are wearing.
3. Decision-making by consensus.
4. Be present for every meeting. If you are unable to attend, send a representative.
5. Meetings are open to the public but the public is not part of the core group. Public input can be made through a group representative to the core group.
6. DLNR/DOFAW staff will provide logistical support as needed for group proceedings.

participation program to identify issues, concerns, opportunities, and options for the management of the NARS, with the hopes of designing in changes to the management plan” and decided: “that the scope of the meetings would be expanded to include issues and concerns that were important to neighboring areas and uses relative to the NARS.” Then facilitators asked the working group to develop a set of consensus guiding principles that the members would periodically revisit to keep them focused on their objectives. After several months of facilitated discussions, the working group finally came to consensus on nine guiding principles (Box 2).

What is noteworthy about the group’s guiding principles is that three directly call for sustained public involvement in management plans, monitoring, and protection. Two of the principles call for structural changes in management practices by agencies, Game Management Areas, and federal, state, or private forest interests. The other guiding principles represent values—no wasting of meat; and goals—pig control was needed. These three issues, community involvement, structural readjustment of agency practices, and values/goals, stood as the foundation from which most of the NAWG’s future discussions would emerge.

Next, the facilitators requested the group to identify opportunities, issues, and concerns regarding management of the NARs. Members contributed their ideas, and a final list was divided into five categories: (1) Community—How to make sure that different voices are heard, and that the NARS is available to many interests; (2) Ecosystem—How to preserve the greatest level of plant and animal diversity; (3) Cultural—How to provide for traditional practices, and who determines what is an appropriate activity; (4) Management—How to best meet the needs of different users, and what are the best practices for maintaining a healthy forest that is useful and available; (5) Overall issues—What is the long-term future of the NARS and how do water resources, current laws, and potential changes impact their sustainability. The group then designed the first round of public meetings to introduce its agreed-upon objectives and to get input from the communities regarding their interests and concerns.

Throughout the group meetings, the facilitators used a variety of communication tools to encourage collaborative work. During the first few meetings, participants were introduced to the framework of interac-

BOX 2.

NATURAL AREAS WORKING GROUP GUIDING PRINCIPLES⁴⁴

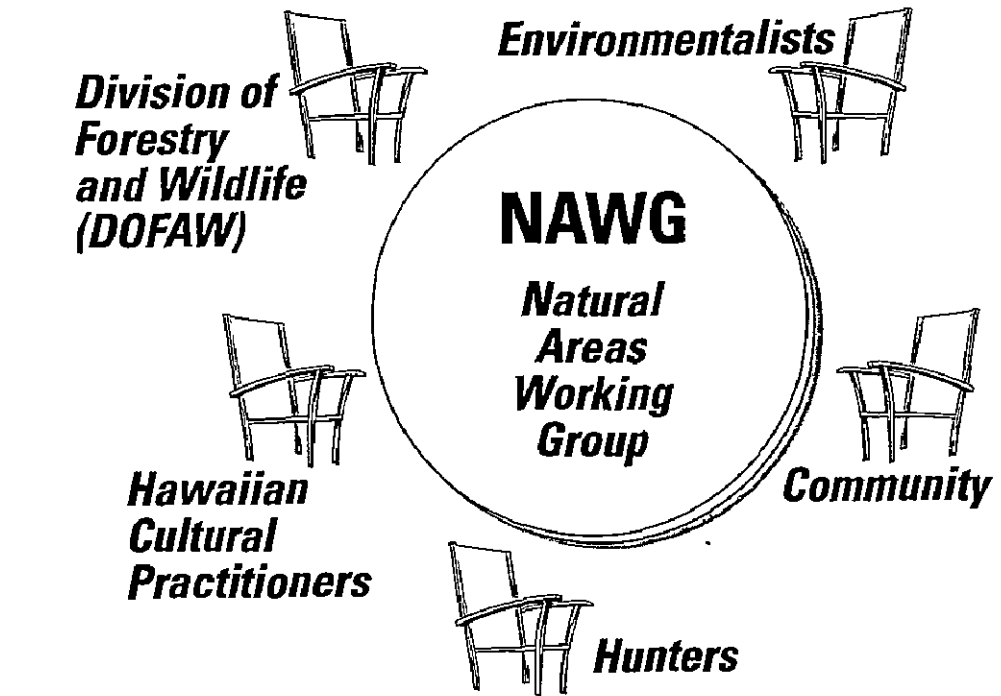
1. Although management of the Natural Area Reserves System was initially the focus of our discussions, the issues being discussed go beyond the NARS. As such, the recommendations and solutions we fashion will reach beyond the NARS.
2. Some areas should be managed for no pigs or the lowest number of pigs.
3. The community should be involved in the development of management plans (for the NARs) and should be part of the decision-making process.
4. Other federal, state, and private landowners/managers of forest lands should adopt/follow guidelines developed by the NAWG where applicable.
5. Some areas should be managed for hunting.
6. More Game Management Areas (GMAs) should be established, but simply establishing them is not enough. We need to look at where GMAs are located and ensure adequate management and game law enforcement.
7. A comprehensive monitoring effort shall be initiated that involves the various community interests to the greatest extent possible.
8. Local communities need to be involved in all steps of forest protection, from planning to implementation.
9. Be mindful of precious resources. "No Waste the Meat."

tion through the Rules of the Road, which emphasizes consensus thinking. Defining its goal statement started the group on its first round of collective planning. Condensing the interests of twenty participants into one statement challenged all members to think integratively. Finally, the development of a set of guiding principles provided the group with a road map of objectives that the members collectively agreed had to be visited over the course of the meetings. Throughout the meetings, the facilitators wrote all comments on flip-chart paper, which ensured that everyone was "hearing" the same thing. As issues and concerns were debated, the group merged them into overarching categories, an exercise that encouraged members to identify common themes and interests. These activities serve to shift individuals away from their initial confrontational positions and to focus on possible elements of agreement. When the goal statement was accomplished and the issues identified, the facilitators broadened the task by having the members design the community meetings, reminding each member that her/his position within the group served as a voice for a larger constituency. Another aspect of the meetings was the inclusion of traditional Hawaiian prayers that drew from the *ho'oponopono* tradition. At the end of each meeting, the group would form a circle, and one of the Hawaiian representatives would lead the group in a prayer, calling for unity in purpose and a mutual respect for the land⁴⁵ (Figure 3).

Furthermore, the facilitators documented each meeting in the form of a "Group Memory," which reiterated the discussions, decisions, and future issues to be addressed at subsequent meetings. The Group Memories were sent to each participant before the next meeting and were reviewed by the group for clarification at the beginning of each meeting. The Group Memories became the group's institutional record of their process history and documented the evolution of its consensus decisions.⁴⁶

After two months of meetings, the group was ready to present its objectives to communities around the Big Island. The intention of holding the public information meetings was to provide an overview of the NARS, the work of the NAWG and for communities to voice their issues and concerns regarding hunting and the protection of native Hawaiian species. The first public meeting was held in Kealakehe in Kona, on the western coast. The NAWG member from Kona opened the meeting by

Figure 3



Facilitator's Role

- Keep Group on Agenda
- Facilitate Dialogue
- Introduce Collaborative Exercises
- Encourage Consensus Thinking
- Guide to Resolutions

Leads to ...

Central Issues Defined

- Hunting interests must be considered.
- Native species need protection management to survive.
- Community wants input into planning process of DOFAW management plans.
- Hawaiian cultural practices should be respected.
- The role of the pig in forest areas needs to be collectively defined.

Facilitator's Role



Young Waimea hunter holding a wild piglet (*sus scrofa*) he caught within the Pu'u O'Umi Natural Area Reserve in Kohala Mountain.

Photo: M. Poffenberger



Hawai'i' NARS manager identifies the endemic pa'iniu plant (*Astelia* sp.), used as an indicator for determining the impact of pigs (*sus scrofa*) in an area.

Photo: C. Josayma



Beautiful wild ginger blossoms may evoke visions of tropical Hawai'i, however, it is a highly invasive non-native species, rapidly displacing endemic flora.

Photo: M. Poffenberger



Damaged roots of the endemic tree fern (*Cibotium* spp.), 'ōhi'a trees (*Metrosideros polymorpha*), and a variety of dense mosses.

Photo: C. Evans



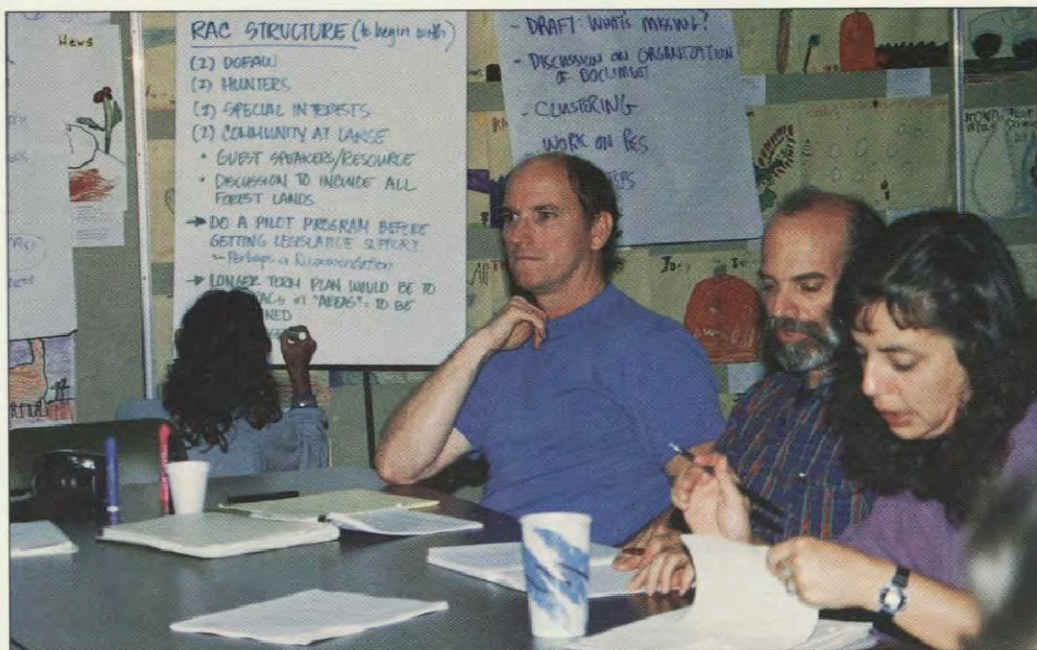
A pristine Hawaiian forest has numerous tree ferns (*Cibotium* spp.), 'ōhi'a trees (*Metrosideros polymorpha*), and a variety of dense mosses.

Photo: C. Evans



An increasingly common sight in the Kohala Mountain are valley walls covered in non-native species that have virtually excluded the endemic plant species of the region.

Photo: M. Poffenberger



NAWG members begin defining the structure and function of the Regional Forest Management Advisory Council for the Kohala Mountain.

Photo: C. Josayma



Cooperative pig monitoring projects through trail access points like this one, are under discussion by the Kohala Forest Management Council.

Photo: C. Josayma



NAWG members consult a map of the Pu'u O 'Umi NAR to identify potential future collaborative project sites.

Photo: C. Josayma



A group of school children learn to identify native species while on a nature visit in the Pu'u O 'Umi NAR, led by the NARS manager.

Photo: C. Josayma

describing the mission of the NAWG, and the facilitators introduced the ground rules that the audience was requested to observe: everyone was encouraged to participate; disagreements were acceptable but people were requested not to interrupt the speakers; and questions were to be taken first, followed by public comment. After the NAWG's list of issues and concerns was introduced, the meeting was opened for discussion. People from the community began asking questions primarily on the logistics of the NARS such as the status of access rights, management of the reserves, and pig control. The public comments that followed supported pig hunting, interest in integrating the Hawaiian concept of *ahupua'a* as a management tool, and interest in volunteering in the management and protection of the NARS. During the question and comment period, the facilitators kept an even flow of discussion by acknowledging concerns, returning the focus to the meeting when comments drifted, clarifying lengthy questions and issues, and pointing out differences in ideas and noting that they were all acceptable and useful.

The second public meeting was held in Waimea, adjacent to the Kohala Mountain. This community has a large constituency of Hawaiian cultural practitioners and pig hunters who hunt in the Pu'u O 'Umi NAR. Fencing was a major issue to the people of this region, and the pig was often praised for its unique role in the culture and the forest environment. Community members raised a number of issues that highlighted other concerns as well. For example, some community members felt that they considered the ecosystem as being inclusive of people and that their traditions, culture, and hunting practices were integral to the region. Some people also felt resentment that people from outside the community were making decisions over the land and telling them what was invasive and what needed to be eradicated, as they too were concerned with native species protection and wanted their interests acknowledged.

The third public meeting was held in Laupahoehoe on the northeastern coast. The questions from the community in this region primarily dealt with the power structure of the NARS Commission and the decision-making process that guides the NARS. Central to the comments, however, were the issues of pigs, fencing, public access, and pig eradication. The facilitator had a greater task in managing the flow of dialogue in this

community as the comments were more emotionally charged than in the other regions, possibly as a result of social stress brought on by recent loss of jobs when the sugar plantation in this region closed.

The last public meeting was held in Hilo where similar comments at the prior meetings emerged, but with a stronger emphasis on defining the environment. Questions were raised by community members: What distinguishes a native forest? By what criteria are the NARs measured as pristine (by pre-Hawaiian or pre-European standards)? How valuable are the resources? Finally, there were suggestions that the environment be seen as a whole, with maps that delineate the ecosystems and the functions that are important to people.

What emerged from the first round of public meetings were distinctive regional differences in community sentiment regarding management of forest lands. However, the common themes were the concern with lack of hunting opportunities and the importance of preserving game and land access issues. Similarly, people were actively supportive of the NAWG's task to integrate community interests into the forest management planning process. Interestingly, however, little voice was given to environmental issues on the whole. One of the environmentalists on the NAWG suggested the following reasons for this outcome: (1) There were probably fewer environmentalists/scientists in these communities to begin with; (2) There were fewer environmentalists/scientists attending such meetings. Before the NAWG was formed, there were several large public meetings at which the environmentalists/scientists were verbally attacked by hunters; and (3) The few environmentalists/scientists who did attend the meetings were less inclined to speak their minds, preferring to let the hunters get things off their chest.⁴⁷ For the NAWG, on the whole, it was instructive for all of the members to hear that most of the issues raised by the community were a mirror of the issues that they had defined as central to their discussions.

Following the public information meetings, the NAWG reconvened and added the public questions and concerns to their own lists of issues under discussion. Then the facilitators requested the group to go through their common categories of community, ecosystem, cultural, management, and overall issues, and identify points that members felt needed clarification. A list of thirty-five questions emerged from the group, with

the majority directed to DOFAW regarding management and decision-making procedures. Members took the responsibility for the issues that they were familiar with and agreed to locate background information material for the group.

At the next NAWG meeting, following a vote to select ten of the thirty-five questions for presentation, the first questions was given by a DOFAW staff member regarding the location of Game Management Areas, DOFAW policies, funding, and staff. A second presentation by a NARS staff member explained the difference between a healthy forest and a pig/weed-degraded forest and described the indicators that managers use to determine this. The remaining questions for clarification focused on access rights, hunting rights on leased lands, environmental status of native forests, role of pigs in traditional and contemporary culture, and maps of hunting grounds. Out of the thirty-five questions, only one question called for information that came from the community's knowledge, and that was their perspective on the role of pigs in the forest. The rest of the presentations were made principally by the DOFAW staff.

The facilitators then requested the NAWG members to describe their personal understanding and the values they hold regarding the cultural traditions and Hawai'i's environment, and what changes have occurred to both over the centuries. This exercise engaged members in explaining where they gained their knowledge, and members found that their references for understanding the culture and environment came from family histories, academic institutions, as well as personal experiences. By linking the historical changes with personal value systems, the group was challenged to better understand the diversity of interests and perceptions in the land. There were also numerous questions and statements that brought up the differences between scientific and cultural knowledge, and what weight they might have in measuring environmental impacts or in deciding long-term management options.

Following this exercise, one of the hunters suggested that the NAWG use maps to delineate the interests of the hunters and DOFAW. One of the scientists requested the hunters to consider making maps of their hunting areas, pig populations, and biological areas that the hunters believed were important. A NARS staff member noted that their agency's maps only delineate the formal hunting areas. Because the NARS staff was not

responsible for game management, they had little information on which areas were most frequented by hunters, where the pig populations were located, and what the actual statistics were for annual kills. The hunters agreed to prepare a series of maps depicting this information, based on their knowledge.

Mapping Local Hunting Practices and Environmental Changes

To date, the only maps that had been used during the NAWG meetings were from agencies, reflecting legal jurisdictions and ecological characteristics. The request to have the hunters prepare maps gave them the opportunity to depict the forest environment and changes they witnessed over time, and to identify the central problems and possible solutions. Two members of the NAWG, representing hunting interests from Kurtistown and Waimea, requested the members of their respective hunting clubs to participate in a mapping exercise. The first meeting was held in Kurtistown, southeast of the Big Island. Using topographic maps at a 1:24,000 scale with tracing paper overlays, the hunters sketched out their hunting areas. The locations they mapped included the areas around the periphery of Hawai'i Volcanoes National Park, 'Ola'a Forest Reserve, Pu'u Maka'ala NAR, and the upper Waiakea Forest Reserve. The members listed their primary uses of the forest as hunting pigs, mouflon, sheep, goats, and snaring birds. They also collect plants such as fern shoots (*Diplazium* sp.), watercress (*Nasturtium* sp.), and medicinal plants. Other important uses of these forest regions are to share their knowledge of nature and cultural practices across generations. The hunters cited the rapid decline in the pig population, attributing it directly to fencing and eradication, with other factors being: (1) a growing popularity in hunting for food in response to the economic recession; (2) poor game management by DOFAW with no effort to monitor changes in game or to enhance game habitat; and (3) insufficient law enforcement of game laws.

The hunters proposed several possible solutions to these problems: (1) reduce the amount of actual fencing acreage around the NARS by reassessing the areas that need to be protected; (2) encourage hunters to work with the DOFAW to protect endangered species and assure that pig migration routes are considered; (3) install hunter access gates to areas designated for fencing; (4) use hunters to eliminate pigs or for population

control; (5) increase game animals of all kinds (pigs, goats, and sheep); (6) establish more Game Management Areas (GMAs) and consistently monitor population and restocking when necessary; and (7) conduct better enforcement, including more personnel to monitor hunting areas. Management of the Pu'u Maka'ala NAR would be acceptable to the Kurtistown hunting group if fencing was based on a cooperative decision between hunters and DOFAW and if there was a development of alternate hunting areas with consistent management.

The NAWG hunting representatives from Waimea and Laupahoehoe held a meeting with hunters of the Wildlife Conservation Association of Hawai'i and the Hamakua Hunting Club. These groups hunt primarily in the forests of Kohala, Hamakua, and Laupahoehoe. The hunters listed their primary uses of the forest region as a place for spiritual rejuvenation and quiet refuge. They believe that the Kohala Mountain is the mother land of the wild pig and that the pig is an integral part of forest life, because it contributes in a positive way to the environment by eating the dense undergrowth and rooting the earth, which encourages native seeds to germinate and provides food for birds. They believe that the constant migration of the pig moving up and down the mountain to the valleys eliminates the possibility of any long-term damage to an area. The hunters sketched maps of their hunting grounds and the traditional migration patterns of the pigs. According to the hunters, the Kohala Mountain have five known birthing locations from which specific groups of pigs originate. Pig migration patterns are territorial, with certain valleys only containing only black pigs and in other valleys brown and white pigs.⁴⁸

All the hunters had noticed a dramatic drop in the number of pigs in recent years. They attributed the decline to new fencing projects that were impeding the normal migration patterns of the pigs. In addition, they agreed that there had been a sharp increase in the number of hunters. Another factor they thought was contributing to the decline in pigs in the Laupahoehoe region was a road accessible to the top of the mountains. This road gave hunters access to the areas where pigs give birth and possibly contributing to the sharp decline in overall pig numbers because they no longer have places of refuge. The hunters also were aware of an increased density in the forest undergrowth. Many nonnative species such as palm grass (*Setaria palmaefolia*), strawberry guava (*Psidium*

cattleianum), and banana poka (*Passiflora mollissima*), have taken over their traditional hunting areas.⁴⁹ These are species that hunters believe pigs keep under control by their foraging. The hunters believe that a healthy forest was a “clean” forest, not overgrown and not overtilled. They noted that recent problems of overrooting by pigs are occurring because pigs are increasingly restricted in their migration patterns due to fencing.

The hunters from Waimea and Laupahoehoe presented the following recommendations: (1) propagate rare plants to ensure that they would survive; (2) NARS staff should work with hunting clubs to identify pig-impacted areas and to “seek a balance” between the pigs and protecting the environment; (3) “balance” should be collectively determined by the NARS staff and the hunting community; and (4) communities must continue to have open access to the NARs.

Noteworthy here is that for both groups of hunters, the central issues were fencing and pig eradication. Yet, so far, only a 1.5-mile stretch of fence has been put in by DOFAW on the Kohala Mountain and the only pig control program that had been initiated was within Hawai‘i Volcanoes National Park. What had been occurring over the years, however, was an increase of fencing in private and other forest lands, constraining open access to many of the neighboring forest regions. The reaction that the hunters had to the fence in the Pu‘u O‘Umi NAR was in response to the perceived threat of increased restriction on public lands. Similarly, with the recent sugar plantation closures, more men on the Big Island were relying on pig hunting to supplement their families’ food, and to relieve themselves of mental stress. These issues came to the forefront during the hunters’ mapping process, bringing greater clarity to the underlying causes that had led them to challenge DOFAW’s management practices in the NARs.

Balancing the Information Needs and Designing a Consensus Agreement

At the next NAWG meeting, the facilitators initiated a discussion on how NAWG members would categorize their interests in the forest in terms of low, medium, and high values. The environmentalists placed a high value on lands containing rare and endangered species, functioning

native ecosystems, and with little or no human impact. NARS staff explained that they determine land values after biological surveys had been conducted for inventories to monitor quality and change. The hunters used their maps to illustrate their high-value areas where they believe the human, plant, and pig relationships were balanced. By referring to the map outlining the traditional pig migration routes in the Kohala Mountain, the hunters were able to visually articulate how they believed the fences forced pigs to move to new areas.

As a homework exercise, the NAWG members were requested by the facilitators to consider possible solutions to the conflict between hunting interests and protecting native Hawaiian species, and to develop possible management solutions. In their management proposals NAWG members were asked to consider what changes (e.g., new rules, revision of legislation, additional funds) would be necessary to achieve their plan and to identify possible constraints and alternatives.

The next time the NAWG convened, the facilitators had each member put forth one recommendation at a time. As ideas were generated, they were noted on flip-chart paper and placed around the room. A few of the members had developed full proposals and wanted the opportunity to present their complete concept, but the facilitators explained that this process was designed specifically to integrate the group's ideas into a collective package. When all of their ideas had been listed, the facilitators requested that the members discuss each item and decide which of the action points the group agreed on and which ones were still unclear or unacceptable. The result was a list of consensus recommendations and an alternate list of recommendations that needed further discussion.

The alternate list of recommendations contained ideas that had met with some disagreement. On this list were proposals for fencing, buffer zones, pig relocation, propagation of rare plants, public access, and the formation of "Regional Forest Management Advisory Council (RFMAC)"—a subgroup of the NAWG that would address land use issues at a local or regional level. The facilitators led the NAWG members through the alternate list of controversial recommendations, and each item was discussed for changes in language, integration into another recommendation, or dropped all together.

The recommendation to develop a RFMAC elicited much discussion.

The facilitator asked the NAWG members how they envisioned such a council. The Big Island NARS manager suggested that it could function as an advisory council, with regular input from the community. One of the environmentalists proposed that there should be regionally based groups rather than one island-wide group. Communities could establish forest management advisory groups that would address not only the NARs but also other areas. The NAWG members finally agreed on a recommendation to "Develop and formally establish community-based local regional advisory councils (the make-up of which will be equally represented to include hunters and other concerned community members and interests) which will assist DOFAW in developing a management plan for each Natural Area Reserve on the Big Island. These councils would be encouraged to expand their discussions so that they might assist in the management plan for other related areas (e.g., forest reserves, national wildlife refuges, national parks)."⁵⁰ The next task was to clarify the function of the RFMAC. The questions that the group raised revolved around definitions of the actual political power and ideal size of an RFMAC. They all agreed that the larger the constituency, the greater the influence of such a group. There was further discussion on where on the Big Island the RFMACs would be established, which areas they would make recommendations for, and whether it was better to organize RFMACs according to political jurisdictions, natural land boundaries, or community interests. Additionally, the group decided that the NAWG should continue to exist and to meet quarterly to oversee the progress of the RFMACs.

The facilitators put together a preliminary consensus draft report entitled "Recommendations of the Natural Areas Working Group." The sixteen-page document consisted of an introduction, the NAWG guiding principles, and recommendations for actions. A second draft document was developed by the Big Island NARS manager who merged the various recommendations into several categories. The group reviewed the two draft documents and decided that an integration of both would best serve its interests, using the facilitators' introduction, guiding principles, and the action categories (Figure 4).

There were two more scheduled NAWG meetings before the final round of public information meetings were to be held. These were used to finalize the draft report that would be presented to the communities on the

Big Island as the consensus decisions that emerged from the NAWG. This part of the NAWG process was a turning point for the group. As one of the members recalled, "The NAWG's compiled list of recommendations and proposed actions were the product of our collective knowledge, creativity, ideas, and willingness to try and resolve the problems. The thought of actually changing the status quo energized the group."⁵¹

The NAWG draft report was completed in December 1994 and consisted of four parts: an introduction to the NAWG, its guiding principles, recommendations, and proposed actions.⁵² The forty-five recommendations were divided into three sections: resource management, community participation, and education. Thirty-one recommendations were listed under resource management including developing cooperative management programs within GMAs with a position for hunters to participate in ungulate data collection, an "Adopt a Forest" program for the preservation of unique forest habitats, and an information program to alert hunters of fresh pig signs to assist them in locating game. An additional ten recommendations dealt with the methods for assuring community participation in management plans, the need for expanding GMAs, the accessibility into areas for hunting, and the need for enforcement, audits, and hunter hotlines.

Under community participation, the proposed actions included joint monitoring of native species of plants, birds, and water resources; volunteer coordination; expanding public and private stewardship programs; and assuring greater community control in government committee appointments. The education component of the NAWG report called for establishing a mechanism to assure regular information exchange; identifying information channels between conservation efforts and community interests; and expanding information to include hunter education and public awareness. The NAWG's proposed actions recommended the establishment of Regional Forest Management Advisory Councils, a legislative resolution to expand GMAs and hunters' involvement in management, an audit of federal funds for game management, a review of selected NAR boundaries, as well as a budget request for a joint-monitoring program and an information-education coordinator.

The final round of public information meetings was scheduled to inform the communities in Kealahou, Waimea, Laupahoehoe, and Hilo

Hunters Draft Resolutions



House Passes 2 Resolutions

- 1) DLNR/DOFAW to hold facilitated meetings
- 2) DOFAW to accommodate interests of hunters to manage pig populations



Natural Areas Working Group formed — Spring 1994



Constituents

- Hunters
- Government agencies
- Environmentalists
- Community members
- Hawaiian cultural practitioners



Rules of Road / Goal Statement

- Outlined process procedures
- Defined roles and responsibilities
- Encouraged inclusive thinking
- Provided consensus direction



Guiding Principles

- Broadened land area under discussion
- Established communities' interest in management issues
- Acknowledged need to develop game management areas
- Proposed joint monitoring



Opportunities, Issues, and Concerns

- Identified central points for discussion
- Community interests
- Cultural traditions
- Overall issues
- Ecosystem diversity
- Management practices



Public Information Meetings

- Introduced process to wider audience
- Educated public to issues under discussion
- Encouraged questions and comments



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graph TD; A[Information Exchange] --> B[Cultural Values and Environmental Changes]; B --> C[Hunter's Mapping]; C --> D[Political Boundaries, Biological Impact, and Hunting Areas]; D --> E[Design and Refine Recommendations]; E --> F[Public Information Meetings]; F --> G[NAWG drafts final Report and Recommendations Submitted to the State Legislature — Spring 1995];
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Information Exchange

- Clarified management practices
- Raised level of common understanding

Cultural Values and Environmental Changes

- Introduced questions regarding how knowledge is acquired
- Raised questions regarding values and how values are formed

Hunter's Mapping

- Documented local knowledge
- Focused on identifying actual land-use patterns
- Distinguished regional differences

Political Boundaries, Biological Impact, and Hunting Areas

- Identified access issues
- Discussed biological impact
- Clarified hunting issues

Design and Refine Recommendations

- Focused group to reach resolution
- Encouraged consensus decisions
- Formulated action-oriented document
 - Proposed two bills
 - 1) Joint monitoring program
 - 2) New Information Coordinator position

Public Information Meetings

- Summarized NAWG document
- Requested comments
- Answered outstanding questions

**NAWG drafts final Report and Recommendations
Submitted to the State Legislature
— Spring 1995**

of the NAWG's findings and recommendations and to receive final public input before completing the report. The meeting agenda in all four locations was structured in the same fashion: a welcome by one of the NAWG members from the community, an introduction to the mediated process by the facilitators, an overview of the NAWG's guiding principles, proposed recommendations and actions, and a public comment period. In all of the meetings, the overall mood of the community was considerably different from the last round of public meetings. During the first round, the audience asked for clarification of the NARS, how it operated, and its purpose, and expressed frustration over the way they perceived the DLNR. This time, people asked for reassurance that their community would continue to have input into management plans. The central questions revolved around the procedures for establishing RFMACs, concerns over designating GMAs, assurance of enforcement, and issues of accountability. In each region, the concept of establishing RFMACs met with positive responses. One Waimea community member commented, "If we work together, things should work out," while another person from Hilo stated, "The Regional Forest Management Advisory Council concept is the most appealing part of the whole document" (Figure 5).

Following the last round of public information meetings, the NAWG reconvened to finalize its report. The "Report and Recommendations of the Natural Areas Working Group" was completed on March 31, 1995 and distributed to the DLNR director, Big Island elected officials, state legislators, Hawai'i's Congressional Delegation, the governor of Hawai'i, and everyone who had attended the public information meetings or requested a copy.

Upon receiving the NAWG report in April 1995, the State of Hawai'i House of Representatives passed Resolution No. 248, "Requesting the Department of Land and Natural Resources to continue and expand the Natural Areas Working Group Process on the Island of Hawai'i to facilitate greater communication with the hunting community and involve them more directly in resource monitoring programs and planning and management of game management areas." In addition, the resolution called for the establishment of a joint monitoring program for game counts, migration studies, and habitat and native species inventories.⁵³

Hunting Interests

- Expand and improve Game Management Areas
- Improve enforcement of hunting regulations

Native Species Protection

- Joint monitoring of ecosystem
- Joint identification of areas for better management of rare and endangered species
- Develop community program to assist in the protection and management of forest areas

Community Input

- Continuation of NAWG to assist DOFAW in prioritizing management objectives
- Regional groups established to provide locally specific dialog and recommendations

Hawaiian Cultural Practices

- Identify traditional trails to the ocean and the forest
- Joint monitoring for cultural sites and traditional medicinal plants

Role of Pig

- Joint monitoring program to develop common understanding of pig impact, migration patterns, control mechanisms

Forming Regional Forest Management Advisory Councils

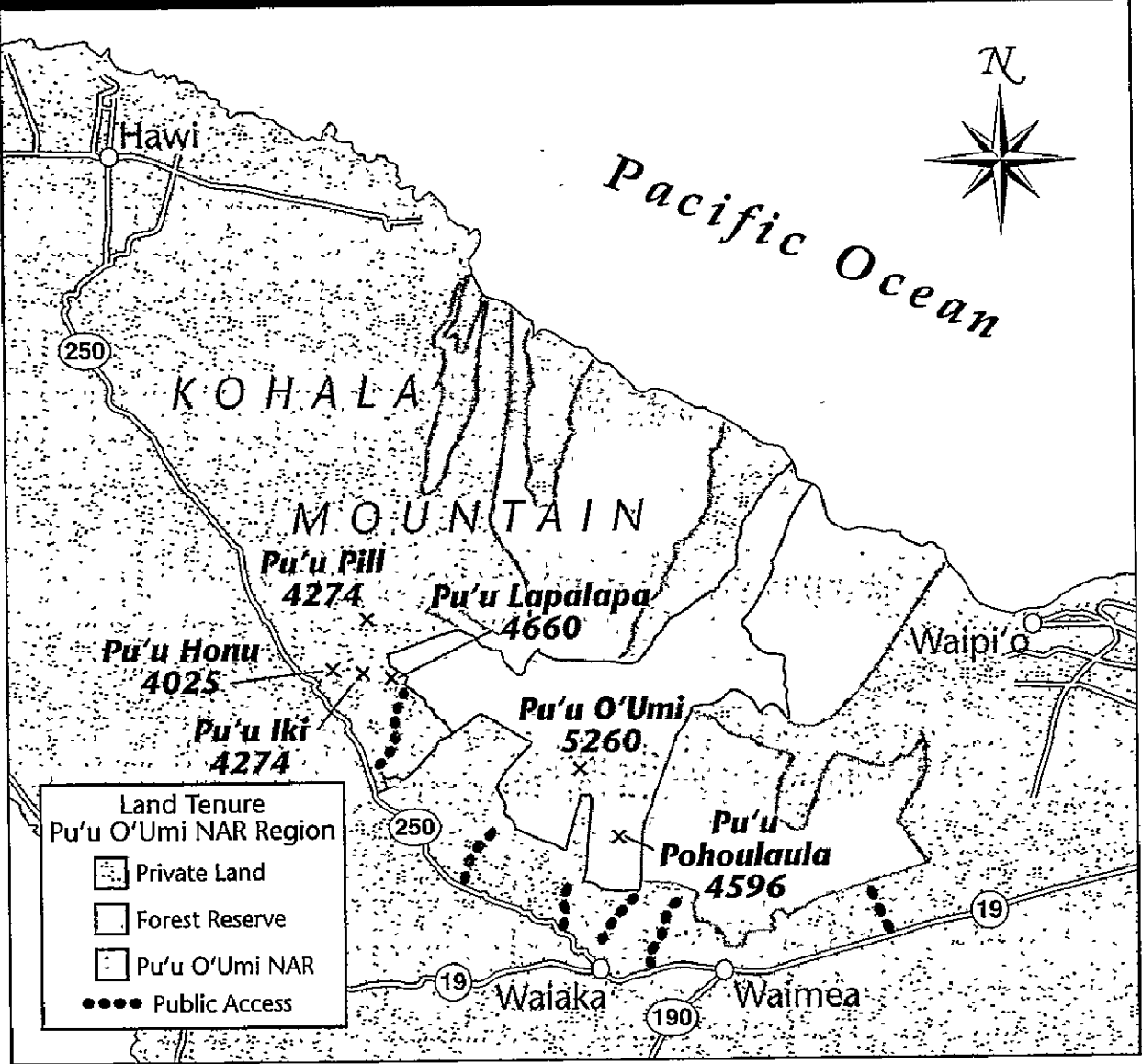
The first Regional Forest Management Advisory Council was formed in June 1995 to evaluate the issues of resource use in the Kohala Mountains region (Figure 6). Twenty-four people joined the council and about ten people have been attending the monthly meetings. Six of the participants are also members of the NAWG. The council represents members of hunting clubs in the area, the Hawaiian community, community associations, large landowners, environmental organizations, and state and federal agency representatives. A local Waimea mediator has been selected to facilitate the meetings. The formation of this new group was to "realize the community concerns and act as the 'action arm' and be the ones to implement actions developed to address community issues regarding the management of its resources."⁵⁴ The council voted on their priority issues: (1) develop a common understanding of land management issues; (2) understand where there is missing information that will assist the council in making informed decisions; and (3) identify areas that need to be managed. In addition, the council is determined to be "action oriented" with an emphasis on identifying possible GMAs and ensuring access rights.

Since its inception, the Kohala Council has discussed methods for learning to see the natural resources with a common eye. Field trips arranged for the council to the mountain have encouraged discussions along the trail regarding ecologically disturbed areas and probable causes of disturbance. The NARS Hawai'i program manager has shown the hunters how he identifies intact native wet forests as those with a dense undergrowth of green mosses and small ferns. One indication of extensive pig populations, aside from visible pig plows and wallows, is when the native pa'iniu plant (*Astelia* sp.) is only found growing in the trees, because pigs have foraged on the ones growing at ground level.

Maps have been used from the onset, with information overlays ranging from Forest Reserves to water resources, hunting units, and rare and endangered biological elements. The council has tried to identify resource-use patterns that need particular attention. The hunters have introduced their pig migration maps, and a Hawaiian medicinal plant gatherer was a guest speaker to discuss unique plant resource areas in the Kohala Mountain. Recent meetings have addressed the establishment of

Kohala Mountain

Figure 6



GMAs, recommended boundary adjustments for Pu'u O 'Umi NAR, and legislative items that the group would like to submit in the future. The DLNR director has attended some of the meetings and is supportive of the council, noting that it was "being spoken of as a model of partnership problem-solving at a conference with government land managers from other states."⁵⁵ He has recommended that the council consider approaching the Hawai'i State Legislature for joint research funds for pig migration studies. One of the preliminary ideas put forth by the council is the possibility of a new policy that would mandate community input before management plans are drafted. Cultural justice has been raised as a mechanism for assuring that Hawaiian rights are respected when management decisions are made. What is emerging from the Kohala Council is a preference to establish mechanisms to reach collectively defined goals. There is significantly more discussion on actual, tangible projects that the council is interested in rather than on defining and explaining individual's positions.

The NAWG is now in its third year of meetings, with one of the original facilitators still involved in guiding the group's meetings. The NAWG is functioning more as a political action group now, overseeing the legal steps required to follow through on the NAWG's consensus recommendations. Since the NAWG's report was submitted in 1995, the group has spent several months organizing the Kohala and Upper Puna/Volcano regional councils. (Some of the NAWG members are members of these councils as well.) The NAWG also prepared testimony for a Hawai'i County Council resolution, which was adopted with most of the group's proposals. The NAWG compiled and prioritized a list of dozens of issues (e.g., pig enhancement and pig damage of the forest), many of which were to be discussed by the group. However, the NAWG decided to re-examine its role and the utility of discussing such issues, knowing that members will never agree on certain things. In addition, the NAWG is serving as an experts group, providing suggestions and recommendations to other agencies such as the U. S. Fish and Wildlife Service, who briefed the NAWG on its ungulate control and fencing program in a National Wildlife Refuge north of Hilo and requested NAWG members' advice on how to work effectively with the hunting interests. Members of DLNR's Division of Conservation and Resource Enforcement have met

with NAWG to discuss fines and penalties for poaching, and a new law was passed by the legislature with NAWG support in spring 1996, providing stricter penalties for illegal hunting.⁵⁶ The NAWG now meets quarterly, focusing on state legislation, audits of funding for game management and hunting programs, increasing funding for game management and protection of native Hawaiian species, and other policy-level matters that affect hunting and species protection, island-wide.⁵⁷

CONCLUSION: THE BENEFITS OF COLLABORATION

This case study has focused on a group of people who came together to seek a solution to conflicts over forest management practices within Hawai'i's Natural Area Reserves System. The issues that emerged, however, were influenced by a much larger system: the interrelationship between people, the environment, and the sustainability of their interaction over time. The natural ecosystems around the Hawaiian Islands have taken centuries to evolve, and since the arrival of the earliest settlers, systematic changes have been brought to the land to accommodate human needs and interests. It has only been in the past century, however, that the intensity of human needs has impacted on the environment to a point that sustainability of the ecosystem to accommodate further changes has come under increased scrutiny. The sharp decrease of native species of birds, plants, and invertebrates has been replaced by a sharp increase of nonnative species. Similarly, the Hawaiians, the earliest settlers of the islands, have faced a significant population decline and are struggling to maintain their cultural identity amid the cultural diversity of the numerous immigrants that have made Hawai'i their home over the past few centuries.

What is unique about this particular case study is that there has been a remarkable convergence of interests to systematically address the multiple needs reflected in contemporary land management issues. Arising from the strong interests of local hunters and their concern over pigs, they have now found themselves at the table discussing future planning, with not only DOFAW, but also with other state and federal land managers, environmentalists, Hawaiian cultural practitioners, and other community groups. What is particularly significant is that the only opportunity for such diverse interest groups to influence public land management practices in the past would have been within the court system, sitting at opposite tables with lawyers arguing their respective positions. Today, they sit at one table and their collaborative decisions are presented to the Hawai'i State Legislature in the form of recommendations and resolutions. The NAWG work is now a respected component of Hawai'i's decision-making process regarding land and resource use issues on the

Big Island.

The techniques of trained facilitators have assisted NAWG members in bridging their differences. During the meetings, the facilitators guided them through collaborative exercises that established dialogue based on open exchange of opinions and acceptability of disagreement, while highlighting consensus solutions. The task of developing an agreed set of guiding principles was particularly important because it brought clarity to the NAWG members that their initial conflict regarding management within the NARS was actually forcing them to focus on a very small percentage of public land. This led to a collective realization that the land under discussion should include areas for species protection and additional GMAs where hunting opportunities. Other considerations that emerged were issues such as cultural concerns, enforcement, and environmental pressures.

One of the critical elements that the NAWG discussed was the need for more information from each of the members regarding his/her interests and values in the land under discussion. This had a two fold consequence. First, bureaucratic interests had not been well understood by many of the NAWG members. The meetings provided the time to clarify the questions the majority of the members had regarding how state land-use management decisions were made in the past. The other benefit was that traditional and scientific knowledge of the forest regions was actively discussed and shared by the hunters, the environmentalists, and the Hawaiian cultural practitioners. The participants were able to introduce their individual understanding of the historical and contemporary land-use practices, giving the group a clearer picture of the differences and similarities by which they view the environment. What emerged was a more complex understanding of the pig, as well as a clearer recognition of their common agreement on some of the detrimental environmental changes that were occurring in the forest, including forest loss due to development. The benefit for the DOFAW, as an agency that has been increasingly held accountable for merging scientific data on ecosystems with public interest sentiments, is that the facilitated process enabled it to work with the hunters, environmentalists, and communities in developing integrated management plans for the NARs that would be acceptable to all parties.

Similarly, the NAWG meetings provided the opportunity for all participants to explain the context of their interests and involvement in the NARs, and to identify new ways to link their interests in a preferred NAR management plan. Community interests were integrated into the planning process through their representatives on the NAWG and during the two rounds of public information meetings. By linking the internal group process with external public meetings, the NAWG members were exposed to the reactions and expectations of the larger constituencies to whom they were responsible. This mechanism ensured that the NAWG considered the larger social ramifications of their proposals and decisions. Similarly, explaining and utilizing the facilitated process during the public information meetings enlightened the communities as to how the NAWG arrived at its recommendations. Finally, the facilitated meeting process assisted people to establish a basic level of trust among themselves, by giving equal time and weight to everyone's interests and concerns.

Throughout the facilitated meeting process, the work of the NAWG was supported at multiple levels. Federal agencies, and the local chapters of national environmental organizations sent representatives to the meetings. These participants were supported by their offices in the ongoing dialogue in various ways: financial support to attend the meetings, office support to supply background research material, and time to lobby for NAWG recommendations. At the state level, the DLNR provided funds for the facilitators, rental of meeting halls, and printing and mailing of the group memories and reports. NAWG members also received encouragement for their participation from state legislators, the Center for Alternative Dispute Resolution, the DLNR and in particular, DOFAW. Locally, support for the process came directly from constituents of the various hunting clubs and civic organizations, through either direct participation or active feedback during the public information meetings. Public interest in the NAWG process has inspired numerous articles in local papers, as well as national journals, which highlight the pigs versus native ecosystem protection, and the formation of the NAWG to resolve conflicts of interest.⁵⁸

An enduring theme of the NAWG meetings focused on public involvement in management planning. The formation of the regionally based

Forest Management Advisory councils, such as the Kohala and Upper Puna/Volcano Councils, ensures that future management decisions will be locally appropriate, because the people who live in the areas being discussed are actively involved. The joint monitoring program, which has been a particular innovation that emerged from the Kohala region, will assist in designing future site-specific recommendations, as well as clarify, for the hunters and DOFAW, the ecological impact of pigs in the forest. The support for selective fencing, access gates, and greater hunting enforcement has been the priority for the Upper Puna/Volcano regions, providing DOFAW with the opportunity to test the impact of excluding pigs from a protected area. Collectively, the council can measure the results of both the regeneration potential of native species and the invasion potential by nonnative plants that are no longer food for the pig. These two community-supported innovations compliment DOFAW's original management objectives for the NARS, which are to protect the natural resources and to educate and inform the public of the unique qualities of the land.

Other forces are also shaping forest planning and management in Hawai'i. With the closure of the sugar plantations, and the subsequent need to develop new business and job opportunities, proposals have been put forward to develop commercial forests on fallow agricultural land. This would bring not only a new social environment, as workers retool themselves to shift from sugar to timber production, but also a new physical environment on the Hamakua Coast. Public involvement in project planning and development has already been built into one timber proposal, building on a growing trend to include public interest at the onset of project development, rather than having to contend with adverse public reactions to projects designed in an agency vacuum without public notification.⁵⁹ The Center for Alternative Dispute Resolution has been actively designing new public involvement processes to address recent social and environmental initiatives in Hawai'i. These meetings, which can be termed "conflict-anticipation" planning, are increasingly being promoted for alleviating the need for "conflict resolution" meetings, which entail working backward to unfold where things went wrong. The current situation on the Big Island, with growing support for collaborative planning at the state and regional levels, highlights the reality that while

adjustments take time, people are willing to participate in planning processes that affect them directly.

What lessons can be drawn for resolving future land-use conflicts? Given the increased complexity of resource use interests today, facilitated meetings can provide a basic foundation for bridging conflicts by encouraging a balanced exchange of information to assist diverse interest groups to move toward consensus solutions. In this case study, prior to the facilitated meetings, the hunters were struggling to cope with the decline in pigs; DOFAW was struggling to manage the NARS with limited staff; environmentalists were working to find solutions to the rapidly degrading natural environment; and Hawaiian rights activists were seeking to assure that their culture and traditions were respected. Some were working at cross-purposes, often diminishing the potential of the others to reach their preferred goals. By voluntarily participating in the group process, through integrating their ideas into consensus solutions, these individuals are realizing that their proposals for new collaborative management strategies are providing the bridge that links their common concerns regarding sustainability of forest resources. In addition, they have learned that by working together, their collective strength to influence change in a preferred direction is much greater than before. The final recommendations that have emerged from the NAWG clearly represent an effective model for sustaining collaborative planning.

NOTES

1. Two excellent books on the subject, see Gail Bingham, *Resolving Environmental Disputes: A Decade of Experience* (Washington, D.C.: The Conservation Foundation, 1986); and James E. Crowfoot and Julia M. Wondolleck, *Environmental Disputes: Community Involvement in Conflict Resolution* (Washington, D.C.: Island Press, 1990).
2. There has been much discussion on the role of the mediator. Two interesting articles which cover in detail some of the central elements and ethics of facilitating public environmental issues, are in Gerald W. Cormick, "Intervention and Self-Determination in Environmental Disputes: A Mediator's Perspective," in *Resolve*, (Winter 1982), 1-6; and Howard Bellman, Gail Bingham, Ronnie Brooks, Susan Carpenter, Peter Clark and Robert Craig, "Environmental Conflict Resolution: Practitioners' Perspective of an Emerging Field," in *Resolve* (Winter 1981), 1-7.
3. For invertebrates, see Charles P. Stone and J. Michael Scott, "Conservation Status of Native Terrestrial Invertebrates in Hawai'i," in *Hawai'i's Terrestrial Ecosystems: Preservation and Management* (Honolulu: University of Hawai'i, 1985), 105-26. For birds, see statistics drawn from Sierra Club Legal Defense Fund listing of "Endangerment and Extinction's in Hawai'i" (1 March 1996). For plants, see statistics drawn from Sierra Club Legal Defense Fund listing of "Status of Hawaiian Plants" (1 April 1996).
4. For an overview of Hawaiian society, see Linda Cuddihy and Charles Stone, *Alteration of Native Hawaiian Vegetation: Effects of Humans, Their Activities and Introductions* (University of Hawai'i: Cooperative National Park Resources Studies Unit, 1990), 52- 71.
5. Mary Kawena Pukui, *Nana I ke Kumu*, vol. 1 (Honolulu: Edward Enterprises, 1972), 60-70.
6. There are differing opinions on the exact numbers of Hawaiians in the pre-Western contact period, ranging from 250,000 to a recent projection of 800,000. For a recent Hawaiian population assessment refer to, David Stannard, *Before the Horror*, (Honolulu: Social Science Research Institute, University of Hawai'i, 1989).
7. Cuddihy and Stone, *Alteration of Native Hawaiian Vegetation*, 25-31.
8. Quentin P. Tomich. *Mammals in Hawai'i* (Honolulu: Bishop Museum, 1969), 81.
9. Cuddihy and Stone, *Alteration of Native Hawaiian Vegetation*, 38.
10. Lawrence H. Fuchs, *Hawai'i Pono: A Social History* (New York: Harcourt, Brace and World, 1961), 13.

11. Legislative Reference Bureau, *Public Land Policy in Hawai'i: An Historical Analysis* (Honolulu: University of Hawai'i, 1969), 159-163.
12. Melody Kapilialoha MacKenzie, *Native Hawaiian Rights Handbook* (Honolulu: University of Hawai'i Press, 1991). This book focuses on the changes within the Hawaiian culture, with a particular focus on traditional and contemporary land use practices. Another particularly insightful article on the impact of changes in the traditional Hawaiian land holding practices is by Neil M. Levy, "Native Hawaiian Land Rights," in *California Law Review* 63 (1975), 848-885.
13. Tom Tagawa, "Forestry in Hawai'i" in-house paper (DLNR/DF, 1957), 1-4.
14. Fuchs, *Hawai'i Pono*, 380.
15. Michael Frome, *The Forest Service* (Boulder: Westview Press, 1984), 28-29.
16. Natural Area Reserves System Act 139, Chapter 195, section 195-11.
17. Additional members were later added to the commission.
18. The Hawai'i Natural Area Reserves System: Criteria for Selecting Natural Areas-Adopted by Natural Area Reserves System Commission (25 February 1971).
19. Ibid.
20. Process for Designation of Natural Area Reserves (DLNR, December 1991), 3. Draft.
21. Hawai'i Natural Area Reserves System, DLNR Flyer (December 1991).
22. Natural Area Reserves System Act 139.
23. Management Policy for the Natural Area Reserves System, Natural Area Reserves System Commission, State of Hawai'i (March 1984), 3-4.
24. The Nature Conservancy Newsletter (June 1988), 4-5.
25. Hawai'i Natural Heritage Program, The Nature Conservancy Of Hawai'i. Biological Overview of Hawai'i's Natural Area Reserves System (1987).
26. Groome Poyry Ltd., "Hawai'i Forestry Investment Memorandum." Prepared for the State of Hawai'i, Dept. of Business, Economic Development, and Tourism (August 1994).
27. Dept. of Business and Economic Development and Tourism, *State of Hawai'i Data Book 1993-1994: Statistical Abstract of Hawai'i* (June 1994).

28. Poka Laenui, "The Rediscovery of Hawaiian Sovereignty," *American Indian Culture and Research Journal* 17:1 (1993), 79-101.
29. Charles Kekuewa Pe'ape'a Makawalu Burrows, "Hawaiian Conservation Values and Practices" in *Conservation Biology in Hawai'i*, ed. Charles Stone and Danielle B. Stone (University of Hawai'i: Cooperative National Park Resources Studies Unit, 1989), 203-213.
30. Rev. Moses K. Keale, "Sovereignty Begins in the Naau" in *Ka Wai Ola O Oha*, (May, 1993).
31. Levy, "Native Hawaiian Land Rights," 848-885.
32. Tagawa, "Forestry in Hawai'i and DLNR, "Process for Designation of the Natural Area Reserves."
33. Lloyd Case, Wildlife Conservation of Hawaii, Waimea, personal comment to author.
34. Lloyd Case, Wildlife Conservation of Hawaii, Waimea, personal comment during 19 September 1994 meeting.
35. Stephen Anderson and Charles P. Stone, "Snaring to Control Feral Pigs *Sus scrofa* in a Remote Hawaiian Rain Forest," *Biological Conservation* 63 (1993), 195-201.
36. Cheong Diong, "Population Biology and Management of the Feral Pig in Kipahulu Valley, Maui" (diss., University of Hawai'i, 1982).
37. Steve Anderson and Patti Welton "Recovery of a Hawaiian Rainforest Five Years After Feral Pig Control Kipahulu Valley, Haleakala National Park" (pamphlet made available to NAWG participants by Hawai'i State NARS Manager, n.d.).
38. Hawai'i Natural Heritage Program, The Nature Conservancy of Hawai'i, Pu'u O'Umi Natural Area Reserve Resource Information Notebook 1 (July 1989), 4-14.
39. Ibid., 21.
40. "Hunters Seek More Voice in Natural Area Management" Resource /DLNR Publication No. 11 (July 1993), 1-3.
41. Hawai'i Natural Heritage Program, Nature Conservancy of Hawai'i "Pu'u O 'Umi."
42. Stanley Yasuda, hunter representative on NARS Commission, personal comment.

43. For an excellent article on the history of government-sponsored mediation, see Peter Adler, "State Office of Mediation: Thoughts on the Evolution of a National Network," in *Kentucky Law Journal* 81:4 (1992-1993), 1013-27.
44. Revised Guiding Principles of the Natural Areas Working Group (spring, 1994).
45. Hannah Springer, Lili'uokalani Ross and Lloyd Case contributed to leading the group in the evening's closure ceremony.
46. Copies of all the NAWG Group Memories are kept on file with Bill Stormont, Big Island NARS Branch Manager.
47. Marjorie Ziegler, Sierra Club Legal Defense Fund, personal written comment to author.
48. Lloyd Case, Wildlife Conservation of Hawaii, Waimea.
49. For an overview of alien plants in Hawai'i, see Clifford Smith "Impact of Alien Plants on Hawai'i's Native Biota," in *Hawai'i's Terrestrial Ecosystems Preservation and Management*, ed. Charles P. Stone and J. Michael Scott (Honolulu: University of Hawai'i, 1985), 180-243.
50. NAWG Group Memory (19 October 1994), 5.
51. Marjorie Ziegler, Sierra Club Legal Defense Fund, personal written comment to author.
52. Guiding Principles, #2 and #3 were reworded and expanded (shown in italics here) as follows:
 - Some areas should be managed for no pigs or the *lowest number of game animals possible*. Some areas should be managed for hunting.
 - The community should be involved in the development of management plans and be part of the decision-making process *through representation on the NAWG and Regional Forest Management Advisory Councils (RFMACS) at public meetings, and through other forums of participation, to gauge progress in management of natural resources*.
53. House Resolution No. 248, House of Representatives, 18th Legislature, State of Hawai'i, (12 April 1995).
54. Group Memory, RFMAC, Meeting No.1 (21 June 1995), 4.
55. Group Memory, Kohala Forest Management Group, Meeting No. 4, (6 September 1995), 4.

56. State Bill No. 2659 S.D., The Senate, 18th Legislature, State of Hawai'i, (4 April 1996).
57. Marjorie Ziegler, Sierra Club Legal Defense Fund, personal written comment to author.
58. The following publications have focused on various aspects of the NAWG work: "Hunters Seek More Voice in Natural Area Management" in *Resource/DLNR* (July, 1993); Bill Stormont, "Progress Made by Big Island Natural Areas Working Group" in *Hawai'i's Forests and Wildlife (DLNR)* 9:3 (Fall 1994); Peter Adler "Pig Wars: Mediating Forest Management Conflicts in Hawai'i" *Negotiation Journal*, (July 1995), 209-215; Stu Dawrs "Friend or Foe: Pig Tales" in *Honolulu Weekly*, 6:9 (28 February 1996); Elizabeth Royte "Hawai'i's Vanishing Species" in *National Geographic* 188:3 (September 1995), 2-37.
59. Groome Poyry Ltd., "Hawai'i Forestry Investment Memorandum."

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- No. 1 *Sustaining Southeast Asia's Forests*, June 1992
- No. 2. *Community Allies: Forest Co-Management in Thailand*, August 1993
- No. 3. *Communities and Forest Management in East Kalimantan*, August 1993
- No. 4. *Upland Philippine Communities: Guardians of the Final Forest Frontier*, August 1993
- No. 5. *Proceedings of the Policy Dialogue: Natural Forest Regeneration and Community Management*, April 1994
- No. 6. *Transitions in Forest Management: Shifting Community Forestry from Project to Process*, August 1995
- No. 7. *Grassroots Forest Protection: Eastern Indian Experiences*, March 1996

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Field Methods Manual, Vol. III: Manual Geographic Information Systems for Joint Forest Management Inventory, Planning, and Monitoring, forthcoming 1997

